

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 5193 (1998): Rubber sealing rings for domestic fruit and vegetable preserving jars Specification [PCD 13: Rubber and Rubber Products]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

घरेलू फल एवं सब्जी परिरक्षी मर्तबानों को सीलबंद करने के

रबड़ के छल्ले — विशिष्टि

(पहला पुनरीक्षण)

Indian Standard

**RUBBER SEALING RINGS FOR DOMESTIC
FRUIT AND VEGETABLE PRESERVING JARS —
SPECIFICATION**

(*First Revision*)

ICS 83.140.50

© BIS 1998

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1969. In the present revision the requirements of tensile properties and accelerated ageing have been included in the light of experience gained over the years. Recommended compounding ingredients have been modified. New test method for determination of zinc oxide has been incorporated in place of existing potassium cyanide method because potassium cyanide is highly poisonous and hazardous chemical.

All compounding ingredients used in the rubber compound from which sealing rings are made should be free from harmful materials liable to extraction by contact with foodstuffs or which may cause the development of undesirable odour, taste, or discolouration. The types of compounding ingredients recommended for the purpose are given in Annex A for the guidance of manufacturers.

IS 12581 : 1989 'Glass containers for domestic fruit preserving — Specification' covers standard neck sizes. It is necessary that the dimensions of rubber sealing rings shall correspond to the details given in the above standard to ensure air-tight sealing. The option of selecting a particular standard neck size may be left to the purchaser of glass containers. This standard, therefore, prescribes only tolerances on various dimensions of rings.

This standard contains clauses **3.3**, **3.6**, **4.1** and **J-2.2.1** which call for an agreement between the purchaser and the supplier.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

RUBBER SEALING RINGS FOR DOMESTIC FRUIT AND VEGETABLE PRESERVING JARS — SPECIFICATION

(*First Revision*)

1 SCOPE

This standard prescribes the requirements, methods of sampling and tests for rubber sealing rings to be used for domestic fruit and vegetable preserving jars.

2 NORMATIVE REFERENCES

The following Indian Standards contain provisions which, through reference in this text, constitute provisions of the standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
170 : 1986	Acetone (<i>third revision</i>)
264 : 1976	Nitric acid (<i>second revision</i>)
265 : 1993	Hydrochloric acid (<i>fourth revision</i>)
505 : 1978	China clay Kaolin (<i>second revision</i>)
1070 : 1992	Reagent grade water (<i>third revision</i>)
1675 : 1971	Stearic acid, technical (<i>first revision</i>)
1685 : 1975	Whiting for rubber industry (<i>first revision</i>)
3400	Methods of test for vulcanized rubbers
(Part 2) : 1995	Hardness (<i>second revision</i>)
(Part 4) : 1987	Accelerated ageing (<i>second revision</i>)
12581 : 1989	Glass containers for domestic fruit preserving

3 REQUIREMENTS

3.1 Material

3.1.1 The sealing rings shall be made from rubber, compounded and vulcanized.

3.1.2 All the compounding ingredients used in the rubber shall be free from harmful toxic chemicals

liable to extraction by contact with foodstuffs or which may cause the development of undesirable odour, taste or discolouration.

3.1.3 For coloured rings, mercuric sulphide, lithophone and zinc sulphide shall not be used. Inorganic pigments and organic dyestuffs used shall satisfy the requirement prescribed in **3.1.2**.

3.2 Workmanship and Finish

3.2.1 The rings shall be free from visual defects in material, workmanship and finish.

3.2.2 The rings of each batch shall be of uniform colour.

3.3 Dimensions

The dimensions of the rings shall be as agreed to between the purchaser and the supplier.

3.3.1 Tolerances

The dimensions shall, however, be subjected to the following tolerances:

<i>Dimension</i>	<i>Tolerance, mm</i>
Inside or outside diameter	± 0.50
Width	± 0.20
Thickness	$\left. \begin{array}{l} + 0.15 \\ - 0.10 \end{array} \right\}$

3.3.2 Each ring shall be uniform in diameter (inside or outside), width and thickness.

3.4 Tensile Properties

3.4.1 The tensile strength of the rubber shall not be less than 100 kg/cm².

3.4.2 The elongation shall not be less than 250 percent.

3.5 Ageing Test

The rubber when subjected to ageing test in air oven for 72 ± 2 hours at 100 ± 4°C shall comply with the following:

- a) Change in tensile strength, percent = $\frac{+ 30}{- 10}$

- b) Change in elongation, percent = + 30
 c) Change in hardness, IRHD = ± 3

3.6 Low temperature Flexibility

To be agreed to between the purchaser and the supplier as an optional requirement depending upon the storage conditions.

3.7 The ring shall also comply with the requirements prescribed in Table 1.

Table 1 Requirements for Rubber Sealing Rings
 (Clauses 3.7, 6.2 and J-2.4)

Sl No.	Characteristic	Requirement	Method of Test, Ref to Annex
(1)	(2)	(3)	(4)
i)	Nature of water extractive	No colour, odour or taste shall be developed or precipitate formed in the extracted solution	B
ii)	Free sulphur, percent by mass, <i>Max</i>	0.2	C
iii)	Total zinc oxide, percent by mass, <i>Max</i>	2.0	D
iv)	Heavy metals	Shall pass the test	E
v)	pH of aqueous extract	7.0 ± 0.2	F
vi)	Tension set before heat treatment, percent, <i>Max</i>	10	G
vii)	Change in tension set after heat treatment, percent, <i>Max</i>	10	G
viii)	Initial hardness, IRHD ¹⁾	55 to 70	H
ix)	Change from initial hardness on ageing, IRHD ¹⁾	± 3	H

¹⁾ International Rubber Hardness Degree.

4 PACKING AND MARKING

4.1 Packing

The rubber sealing rings shall be packed as agreed to between the purchaser and the supplier.

4.2 Marking

4.2.1 Each package shall be marked with the following:

- Name of the material,
- Indication of the source of manufacture,
- Number of rings in each package,
- Net mass of the material,
- Month and year of the manufacture, and
- Lot or batch number.

4.2.2 BIS Certification Marking

The package may also be marked with the Standard Mark.

4.2.3 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5 SAMPLING

The scale of sampling and criteria for conformity shall be as prescribed in Annex J.

6 TEST METHODS

6.1 All tests shall be carried out within three months of the delivery.

6.2 Test shall be carried out according to the methods prescribed in col 4 of Table 1.

6.3 Quality of Reagent

Unless otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in the tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

(Foreword)

RECOMMENDED COMPOUNDING INGREDIENTS

A-1 GENERAL

In giving the following data it is not intended to imply that the use of alternative materials may not give rings of a suitable quality. The recommendations are, in every case, intended mainly to indicate types of materials which have been found, by practical experience, to be suitable for producing rings to be used in the domestic glass jars meant for preservation of fruits and vegetables.

A-2 COMPOUNDING

The rings may be made from natural rubber, or some suitable synthetic non-toxic elastomer or a blend of the two together with the necessary compounding ingredients. The ingredients should be free from the prohibited materials specified in 3.1.

NOTE — In case of natural rubber rings, light coloured crepe, of natural rubber that has been rendered suitable for extrusion (superior processing rubber), air-dried plantation rubber, that is, free from *p*-nitro-phenol (so called air-dried sheets) and in case of synthetic rubber rings, *cis*-1, 4-polyisoprene, polybutadiene, styrene-butadiene copolymers, or nitrile-butadiene copolymers, and chloroprene rubber (polychloroprene) or a blend of any of these may be used as raw material. Divinyl benzene may be used as a third polymerization component.

A-3 ACCELERATORS

Recommended accelerators of the tasteless type to suit the requirements specified in 3.1.2 are thiuram

disulphides or monosulphides, dithiocarbamates and suitable polyamines.

A-4 ANTIOXIDANTS

A-4.1 Where it is considered that an antioxidant be employed, the following materials are recommended to suit the requirements prescribed in 3.1.2:

- a) Condensation products of acetone and aniline, and
- b) Di-B naphthyl-*p*-phenylenediamine (symmetric).

A-5 FILLERS

A-5.1 The following are recommended.

A-5.1.1 *China Clay* — See IS 505.

A-5.1.2 *Kaolin* — See IS 505.

A-5.1.3 *Silica*

A-5.1.4 *Whiting* — See IS 1685.

A-5.1.5 *Carbon Black*

A-6 SOFTENERS

A-6.1 The following softeners are recommended.

A-6.1.1 *Stearic Acid* — See IS 1675.

A-6.1.2 *Petroleum Jelly*

A-6.1.3 *Light Coloured Mineral Oil*

ANNEX B

[Table 1, Sl No. (i)]

TEST FOR COLOUR, ODOUR AND TASTE OF WATER EXTRACTIVE

B-1 PROCEDURE

Using clean forceps, transfer sufficient number of rings weighing about 20 g to a beaker. Autoclave them

with 100 ml of water under a steam pressure of 104 to 138 kPa at a temperature of 120 to 125°C for 30 minutes. Cool and examine the extracted solution.

ANNEX C

[Table 1, Sl No. (ii)]

DETERMINATION OF FREE SULPHUR

C-1 OUTLINE OF THE METHOD

A weighed test portion is extracted with acetone in an all-glass Soxhlet type apparatus for 8 to 16 hours. When extraction is complete, the solvent is evaporated. Free sulphur is determined gravimetrically from the extract.

C-2 APPARATUS

C-2.1 Extraction Apparatus

The extraction apparatus is of the reflux type with the condenser placed immediately above the cup which holds the rubber. The cup is situated in the vapours of

the boiling solvent and is emptied by a siphon. The apparatus is of glass except in patterns where an extraction cup is suspended from the end of the condenser, in which case platinum wire is used for the suspension. The apparatus fits together without the use of cork, rubber or metal and in such a manner that loss of vapour during extraction does not exceed 20 percent of the extracting liquid.

C-3 REAGENTS

C-3.1 Acetone — Conforming to IS 170.

C-3.2 Bromine

C-3.3 Barium Chloride Solution — Dissolve 10 g of barium chloride in 100 ml of water.

C-3.4 Hydrochloric Acid — Conforming to IS 265.

C-4 PROCEDURE

C-4.1 Using clean forceps, transfer sufficient number of rings to weigh about 10 g, to a round bottom flask. Add 100 ml of acetone to the flask and allow to stand overnight. Connect the flask to an efficient reflux condenser, boil and reflux for eight hours. Evaporate carefully to dryness on a steam bath and dry at $100^{\circ} \pm 2^{\circ}\text{C}$ to constant weight. Add to the dried acetone extract 50 ml of water and 1 to 3 ml of bromine and cover with a watch glass. Allow the vessel to stand

in a water bath at 70°C for at least 30 minutes, then remove the watch glass and heat continuously without boiling till the solution is almost colourless. Add one ml of hydrochloric acid, filter the solution and dilute it to 250 ml with water. Heat the solution to boiling, add slowly slight excess of hot barium chloride solution, continue to boil the liquid for 5 to 10 minutes and then allow to stand for one hour at 90 to 100°C . Filter the liquid through a centered glass or Gooch crucible which has been previously washed, dried at 110°C and weighed. After the filtration has been completed, wash the crucible and the precipitate with hot water till the washings are free from chlorides, dry at 100°C for one hour, cool in desiccator and weigh.

C-4.2 Make a blank determination with the reagents using the same quantities and under the same conditions of test and apply the correction, if any, to the weight obtained in C-4.

C-5 CALCULATION

$$\text{Free sulphur content, percent by weight} = \frac{13.73 B}{M}$$

where

B = corrected mass in grams of the precipitate, and

M = mass in grams of the rubber rings taken for the test.

ANNEX D

[Table 1, Sl No. (iii)]

DETERMINATION OF TOTAL ZINC OXIDE

D-1 GENERAL

Presence of zinc oxide is estimated by titrating with standardized EDTA solution. Calcium, Magnesium, Iron, Titanium, Aluminium, Antimony and Silica, if present in the gasket material, do not interfere.

The sample is ashed and the ash is dissolved in hydrochloric acid. Aluminium chloride and ammonium fluoride are added to precipitate calcium and magnesium as the hexafluoro-aluminates, fluoride complexes iron, titanium and excess aluminium. The pH is adjusted to 4.5 and zinc is titrated with EDTA. Total zinc content of the sample is determined and calculated as zinc oxide.

D-2 APPARATUS

D-2.1 Crucibles, porcelain or silica, 30-ml nominal capacity.

D-2.2 Asbestos Board, approximately 100 mm square and 6 mm thick with a hole in the centre to support the crucible so that approximately two-third of it projects below the board.

D-2.3 Electric Muffle Furnace, with thermocouple and thermostat for control of temperature.

D-2.4 Burette, 10 ml capacity, graduated with 0.02 ml dimensions.

D-3 REAGENTS

D-3.1 Acetone, conforming to IS 170.

D-3.2 Aluminium Chloride Solution (0.1 M)

Dissolve 2.42 g and aluminium chloride hexahydrate ($\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$) in water and dilute to 100 ml.

D-3.3 Ammonium Fluoride Solution (3 M)

Dissolve 55.5 g of ammonium fluoride (NH_4F) in water and dilute to 500 ml. Store in a polythene or wax-coated bottle.

D-3.4 Buffer Solution

Dissolve 60 g of acetic acid (CH_3COOH) and 77 g of ammonium acetate ($\text{CH}_3\text{COONH}_4$) in water and dilute to 100 ml.

D-3.5 Dithizone Indicator Solution

Dissolve 0.01 g of dithizone in 10 ml of acetone. Prepare fresh every 48 hours.

D-3.6 EDTA Solution (0.01 M)

Dissolve 3.72 g of ethylene-diamine tetracetic acid, disodium salt, dihydrate, in water and dilute to 100 ml.

D-3.7 Zinc Chloride, Standard Solution

Ignite zinc oxide in a porcelain crucible for 2 hours at $550 \pm 25^\circ\text{C}$ and cool in a desiccator. Dissolve about 1 g of the dried reagent, weighed to the nearest 0.001 g, in 50 ml of water and 20 ml of HCl. Transfer to a 1 000-ml volumetric flask and dilute to the mark with water.

D-3.8 Standardization of EDTA Solution

Standardize the EDTA solution with zinc chloride standard solution. With a pipette, transfer 25 ml of standard zinc chloride solution in a 250-ml conical flask. Add 5 ml of HCl and proceed according to A-4.3, beginning with the addition of Aluminium chloride (AlCl_3) solution. A 50-ml capacity of burette is to be used.

D-3.9 Methyl Orange Solution (1 g/100 ml)

Dissolve 0.025 g of methyl orange in 25 ml of water.

D-3.10 Magnesium Chloride Solution (0.1 M)

Dissolve 2.03 g of magnesium chloride hexahydrate ($\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$) in water and dilute to 100 ml.

D-4 PROCEDURE

D-4.1 Weigh approximately 1 g of sample to the nearest 0.001 g in a porcelain crucible, previously ignited and weighed. Ash it in accordance with B-2.2, if the sample does not contain chloroprene or other rubbers containing halogens.

NOTE — If halogens are present, ash the sample by adding about 5 ml of H_2SO_4 to the crucible containing the weighed specimen followed by cautious heating over a small flame slowly, to allow completion of reaction. Heating rate must be adjusted so that there is no splattering or loss of material from the crucible, until all sulphuric acid has been dried off. Ignite to burn off the carbonaceous material over flame, or in a muffle furnace (at about 950°C for approximately 1 h).

D-4.2 Cool the crucible and wash the ash into 250-ml beaker with a stream of water. Add 5 ml of HCl to the crucible and warm it on a hot plate until the solution just begins to boil. Pour the washing into the beaker. Rinse the crucible once more with 5 ml of HCl and again add the washings to the beaker. Do not filter the solution. Then add 10 ml of HCl to the beaker. Break up any large cakes of ash with a glass stirring rod. Evaporate the solution to 10 ml. If large amounts of precipitate are present some bumping and splattering may occur. This can be reduced by agitating the solution until boiling begins. Transfer the solution to a 100-ml volumetric flask and dilute to the mark with water.

D-4.3 Take out an aliquot of 10 ml from the above solution and transfer it to a 250-ml conical flask, mixing the solution and suspended solids well before aliquoting. Dilute the aliquot to 25 ml and add 1 ml of concentrated HCl, 2 ml of AlCl_3 solution, 5 ml of MgCl_2 solution, 10 ml of NH_4F solution and one drop of methyl orange indicator solution. Add NH_4OH until the indicator is pure yellow in colour and add 0.5 ml more NH_4OH . If the sample is known to be high in zinc or calcium, bring it to boil, boil for 30 seconds, and cool to room temperature. Add 10 ml of buffer solution. Titrate with EDTA solution to a yellow-green colour, using the 10 ml capacity burette.

D-5 CALCULATIONS

$$\begin{aligned} \text{a) Standardization : } C &= \frac{M}{(V_1 \times 40)} \\ \text{b) Analysis: ZnO, percent} &= \frac{(V_2 \times C \times 100 \times 100)}{(S \times A)} \\ &= \frac{(V_2 \times C \times 1\,000)}{S} \end{aligned}$$

where

- C = concentration of EDTA solution, g ZnO/ml
 M = mass of zinc oxide, g;
 V_1 = volume of EDTA solution used in standardization, ml;
 V_2 = volume of EDTA solution used in titration, ml;
 S = mass of sample, g; and
 A = aliquot size, 10 ml.

ANNEX E

[Table 1, Sl No. (iv)]

DETERMINATION OF HEAVY METALS

E-1 OUTLINE OF THE METHOD

Presence of heavy metals is tested by treating the material with hydrogen sulphide. Appearance of black colour or turbidity or both indicates the presence of heavy metals.

E-2 REAGENTS

E-2.1 Concentrated Hydrochloric Acid, conforming to IS 265.

E-2.2 Ammonium Chloride, solid.

E-2.3 Dilute Hydrochloric Acid, 1:1 (*see* IS 265).

E-2.4 Dilute Acetic Acid — 1 N.

E-2.5 Hydrogen Sulphide Solution, freshly prepared saturated solution.

E-3 PROCEDURE

E-3.1 Ash the material as described under **D-1**. Treat the ash with 3 drops of concentrated hydrochloric acid. Evaporate to dryness over a low flame and return to the muffle furnace for 20 to 30 minutes. A clean white ash shall result; otherwise, the hydrochloric acid treatment may be repeated. Dissolve the ash in 1 ml of dilute hydrochloric acid and wash with small quantity of water to an evaporating dish. Repeat washing to ensure complete transfer of the dissolved ash. Evaporate to dryness on a steam-bath and dissolve the residue in about 20 ml of water. Take 10 ml of this solution in a test tube, add 0.5 g of ammonium chloride and 1 ml of acetic acid. Add 5 ml of hydrogen sulphide solution to it.

E-3.2 The material shall pass the test if the solution does not develop any black colour or turbidity.

ANNEX F

[Table 1, Sl No. (v)]

DETERMINATION OF pH OF AQUEOUS EXTRACT

Cut 2 rings to about 2 mm pieces. Autoclave the pieces for 5 minutes at a pressure of 0.4 to 0.5 kgf/cm² with 200 ml of water. Discard the first extract and repeat the process with another 500 ml of water for 40 minutes. Decant the extract, cool and determine the pH with pH-meter equipped with glass electrodes.

ANNEX G

[Table 1, Sl No. (vi) and (vii)]

TEST FOR TENSION SET

G-1 Measure internal diameter of the ring. Mount the ring evenly on a cylinder with diameter twice that of the internal diameter of the ring and keep it for 10 minutes at 27±2°C. Remove the ring and allow to rest for 10 minutes at 27±2°C. Then measure the internal diameter.

G-2 Immerse a ring in boiling water for a period of 4 h, remove and immediately put in cold water for at least 1 h but not longer than 2 h. Determine the tension set on the heat treated ring according to **G-1**.

ANNEX H

[Table 1, Sl No. (viii) and (ix)]

DETERMINATION OF HARDNESS

H-1 Perform this test on a press cured rubber slab of the same compound and cured under the same conditions as for the rings. The minimum dimensions of the slab shall be 7.5 mm × 7.5 mm × 6.5 mm. Determine the degree of hardness in accordance with the method prescribed in IS 3400 (Part 2).

H-2 The test pieces tested for hardness according to **H-1** shall be aged for a period of 168 h at 70 ± 1°C in an air-oven according to the method prescribed in IS 3400 (Part 4). After ageing they shall be tested for hardness in accordance with the method prescribed in IS 3400 (Part 2).

ANNEX J

(Clause 5)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

J-1 SCALE OF SAMPLING**J-1.1 Lot**

In a consignment, all the sealing rings of the same type, dimension, design and manufactured from the same type of rubber and belonging to the same batch of production shall constitute a lot.

J-1.2 Samples shall be selected from each lot separately for ascertaining its conformity or otherwise to the requirements of this specification.

J-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

J-2.1 The number of sealing rings to be selected at random from a lot for different tests shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 2.

Table 2 Scale of Sampling and Permissible Number of Defectives
(Clauses J-2.1 and J-2.3)

No. of Sealing Rings in the Lot	Dimensions, Workmanship and Finish		No. of Tests Each for Tension Set and Hardness [SI No. (vi) to (ix) of Table 1]
	Sample Size	Permissible No. of Defectives	
(1)	(2)	(3)	(4)
Up to 100	5	0	3
101 to 150	8	0	3
151 " 300	13	0	3
301 " 500	20	0	5
501 " 1 000	32	1	5
1 001 and above	50	2	8

J-2.1.1 The rings to be selected from the lot shall be chosen at random. For this purpose at least 10 percent of the packages shall be opened and required number

of rings shall be selected by taking approximately equal number at random from each of the package.

J-2.2 All the scaling rings selected according to **J-2.1** shall be examined for workmanship, finish and dimensions. Any ring failing in one or more of these characteristics shall be considered as defective. If the number of defectives found in the sample is less than or equal to the corresponding permissible number given in col 3 of Table 2, the lot shall be declared as conforming to these requirements, otherwise not.

J-2.2.1 In the case of those lots which have been found unsatisfactory according to **J-2.2**, all the sealing rings may, depending upon the agreement between the purchaser and the supplier, be inspected for these characteristics and the defective ones be removed.

J-2.3 The lot having been found satisfactory for workmanship, finish and dimensions shall then be tested for tension set before and after heat treatment and for hardness before and after ageing. The number of independent tests to be conducted for each of the characteristics, hardness and tension, is given in col 4 of Table 2. For this purpose required number of rings shall be selected at random from those already chosen under **J-2.1**. The lot shall be declared satisfactory results with respect to these characteristics if none of the tests yield unsatisfactory results.

J-2.4 The lot which is found satisfactory under **J-2.2** and **J-2.3** shall be examined for chemical characteristics [see SI No. (i) to (v) of Table 1]. For this purpose, one test shall be conducted for each of the above characteristics. For this, sufficient number of rings shall be chosen from those already selected. A lot shall be deemed to be conforming to the requirements for chemical characteristics, and hence to the requirements of this specification, if all the test results meet the corresponding requirements given in col 3 of Table 1.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc : No. PCD 13 (1313).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 323 01 31, 323 33 75, 323 94 02

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110 002

Telephone

{ 323 76 17
323 38 41

Eastern : 1/14 C. I.T. Scheme VII M, V. I. P. Road, Maniktola
CALCUTTA 700 054

{ 337 84 99, 337 85 61
337 86 26, 337 91 20

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022

{ 60 38 43
60 20 25

Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600 113

{ 235 02 16, 235 04 42
235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400 093

{ 832 92 95, 832 78 58
832 78 91, 832 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR.
LUCKNOW. NAGPUR. PATNA. PUNE. THIRUVANANTHAPURAM.